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EXAMINER

DONG, DALEI

ART UNIT PAPER NUMBER

2879

DATE MAILED: 08/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/047,469

Applicant(s)

EDEN ET AL.

Examiner

Dalei Dong

Art Unit

2879

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2005.
2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-55, 75 and 76 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1, 3, 4, 6, 15, 16, 20, 23-30, 32, 41-43, 47, 50-55, 75 and 76 is/are rejected.
7) ☒ Claim(s) 2, 5, 7-14, 17-19, 21, 22, 31, 33-40, 44-46, 48 and 49 is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 01 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The Amendment filed August 1, 2005, has been entered and acknowledged by the Examiner.

Response to Arguments

2. Applicant's arguments, see pages 8-11, filed August 1, 2005, with respect to the rejection(s) of claim(s) 1-55, 75 and 76 under 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of U.S. Patent No. 5,986,409 to Farnworth.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1, 3, 4, 6, 15, 16, 20, 23-30, 32, 41-43, 50-55, 75 and 76 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,986,409 to Farnworth.

Regarding to claim 1, Farnworth discloses in Figures 1-3, a microdischarge device, comprising: a first layer (substrate 30) having a tapered cavity (40) disposed

therein; an intermediate layer (insulating layer 39) on the first layer (30); and a second layer (conductive traces 36 and 38) on the intermediate layer (39), the intermediate layer electrically insulating the first layer from the second layer (see column 4, lines 60-63), the first (30) and second layers (36 and 38) having a conductivity larger than that of the intermediate layer (39).

Regarding to claim 3, Farnworth discloses in Figures 1-3, the first layer (30) is a semiconductor (see column 4, lines 25-35).

Regarding to claim 4, Farnworth discloses in Figures 1-3, the first layer comprises Si (see column 4, lines 25-35).

Regarding to claim 6, Farnworth discloses in Figures 1-3, the intermediate layer (39) comprises at least one dielectric layer (see column 6, lines 48-51).

Regarding to claim 15, Farnworth discloses in Figures 1-3, the first layer comprises Si (see column 4, lines 25-35).

Regarding to claim 16, Farnworth discloses the claimed invention and the lifetime of the microdischarge device is merely an intrinsic property of the device. The lifetime of the microdischarge device does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

Regarding to claim 20, Farnworth discloses in Figures 1-3, a gas disposed in the cavity (see column 5, lines 16-32).

Regarding to claim 23, Farnworth discloses in Figures 1-3, an optical transmissive material (20) that seals the cavity (40).

Regarding to claim 24, the first layer serves as a cathode of the microdischarge device is a recitation with respect to the manner in which a claimed apparatus is intended to be employed and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2114).

Regarding to claim 25, Farnworth discloses in Figures 1-3 and 5, an array comprising a plurality of microdischarge devices.

Regarding to claim 26, Farnworth discloses in Figures 1-3 and 5, the array is divided into independently excited sub-arrays.

Regarding to claim 27, Farnworth discloses in Figures 1-3 and 5, a lighting array comprising the array of microdischarge devices.

Regarding to claim 28, this recitation is merely a recitation with respect to the manner in which a claimed apparatus is intended to be employed and it does not

differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2114).

Regarding to claim 29, Farnworth discloses in Figures 1-3, a microdischarge device, comprising: a semiconductor layer (substrate 30) having a tapered cavity (40) disposed therein; an intermediate layer (insulating layer 39) on the semiconductor layer (30); and a second layer (conductive traces 36 and 38) on the intermediate layer (39), the intermediate layer (39) electrically insulating the semiconductor layer (30) from the second layer (36 and 38).

Regarding to claim 32, Farnworth discloses in Figures 1-3, the second layer (36 and 38) is a metal.

Regarding to claim 41, Farnworth discloses in Figures 1-3, the semiconductor layer (30) comprises Si (see column 4, lines 25-35).

Regarding to claim 42, Farnworth discloses the claimed invention and the lifetime of the microdischarge device is merely an intrinsic property of the device. The lifetime of the microdischarge device does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations.

Regarding to claim 43, Farnworth discloses in Figures 1-3, the intermediate layer (39) comprises at least one dielectric layer having a lower electrical conductivity than the semiconductor layer (30) and the second layer (36 and 38).

Regarding to claim 47, Farnworth discloses in Figures 1-3, a gas disposed in the cavity (40).

Regarding to claim 50, Farnworth discloses in Figures 1-3, an optically transmissive material (20) that seals the cavity.

Regarding to claim 51, the first layer serves as a cathode of the microdischarge device is a recitation with respect to the manner in which a claimed apparatus is intended to be employed and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2114).

Regarding to claim 52, Farnworth discloses in Figures 1-3 and 5, an array comprising a plurality of microdischarge devices.

Regarding to claim 53, Farnworth discloses in Figures 1-3 and 5, the array is divided into independently excited sub-arrays.

Regarding to claim 54, Farnworth discloses in Figures 1-3 and 5, a lighting array comprising the array of microdischarge devices.

Regarding to claim 55, this recitation is merely a recitation with respect to the manner in which a claimed apparatus is intended to be employed and it does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations (see MPEP 2114).

Regarding to claim 75, Farnworth discloses in Figures 1-3, the cavity (40) has trapezoidal cross-section.

Regarding to claim 76, Farnworth discloses in Figures 1-3, the cavity (40) has trapezoidal cross-section.

Allowable Subject Matter

5. Claims 2, 5, 7-14, 17-19, 21, 22, 31, 33-40, 44-49 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding to claim 2, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a cavity having an inverted square pyramidal shape.

Regarding to claim 5, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising a first layer, the intermediate layer and the second layer form a diode, and the intermediate layer is a depletion region of the diode.

Regarding to claims 7-11, claims 7-11 are allowable because of dependency upon an allowable dependent claim.

Regarding to claim 12, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: an angle of taper of the cavity is at least 20 degrees and at most 60 degrees.

Regarding to claim 13, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: an area of the cavity at a surface of the first layer is not greater than $10^4 \mu\text{m}^2$.

Regarding to claim 14, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a depth of the tapered cavity in the first layer is not greater than 100 μm .

Regarding to claim 17, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a intermediate layer comprises a plurality of dielectric layers, at least two of the plurality of dielectric layers having different dielectric constants.

Regarding to claim 18, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a cavity extends through at least a surface of the second layer.

Regarding to claim 19, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: the side walls of the cavity are coated with a film that reflects light.

Regarding to claim 21, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a second layer comprises an electrically conducting screen disposed on an end of the cavity.

Regarding to claim 22, claim 22 is allowable because of the dependency upon an allowable dependent claim.

Regarding to claim 31, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising a first layer, the intermediate layer and the second layer form a diode, and the intermediate layer is a depletion region of the diode.

Regarding to claims 33-37, claims 33-37 are allowable because of dependency upon an allowable dependent claim.

Regarding to claim 38, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: an angle of taper of the cavity is at least 20 degrees and at most 60 degrees.

Regarding to claim 39, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: an area of the cavity at a surface of the first layer is not greater than $10^4 \mu\text{m}^2$.

Regarding to claim 40, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a depth of the tapered cavity in the first layer is not greater than 100 μm .

Regarding to claim 44, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a intermediate layer comprises a plurality of dielectric layers, at least two of the plurality of dielectric layers having different dielectric constants.

Regarding to claim 45, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a cavity extends through at least a surface of the second layer.

Regarding to claim 46, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: the side walls of the cavity are coated with a film that reflects light.

Regarding to claim 48, prior art of record taken alone or in combination fails to teach or suggest a microdischarge device, comprising: a second layer comprises an electrically conducting screen disposed on an end of the cavity.

Regarding to claim 49, claim 49 is allowable because of the dependency upon an allowable dependent claim.

Response to Arguments

6. Applicant's arguments with respect to claims 1-55, 75 and 76 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following prior art are cited to further show the state of the art of composition of a microdischarge device.

U.S. Patent No. 5,723,945 to Schermerhorn.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalei Dong whose telephone number is (571)272-2370. The examiner can normally be reached on 8 A.M. to 5 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar Patel can be reached on (571)272-2457. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2879

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



August 12, 2005



Joseph Williams
Primary Examiner
Art Unit 2879